

The clinical relevance of implementation of new technologies in extracorporeal circulation

Summary

Background: An organism's inflammatory response related to cardiopulmonary bypass (CPB) use is caused by activation of immune system cells with the production of a whole spectrum of mediators, whose activity can result in organ dysfunction. Current research, in trying to eliminate the negative effects of CPB, is engaging in innovating technology of systems for CPB. One of the last complex innovations is the so-called miniinvasive cardiopulmonary bypass. Till now though, the clinical benefits of using this system has not been clearly proven.

Methods: A group of 54 patients, who were indicated for elective coronary surgery were randomised into two groups – group cCPB (patients operated on using classic CPB in the open modification) and group mCPB (patients operated on using minicircuit). We monitored and compared concentration of interleukin-6, polymorphonuclear elastase, monocyte chemoattractant protein-1, interleukin-10 and soluble receptors for tumour necrosis factor- α in both groups during operation and postoperatively. At the same time we compared the postoperative clinical course.

Results: Both groups did not differ in the basic pre and peroperative characteristics (age, EuroScore, ejection fraction, number of anastomoses, duration of extracorporeal circulation...). We recorded a lower pump flow, priming for mCPB ($p < 0,001$) and significantly reduced hemodilution during CPB. There were no differences in the clinical outcome when comparing both groups. The serum concentrations of monitored laboratory markers of immune system reaction towards CPB showed higher activity while using standard CPB.

Conclusion: The use of mCPB is a safe method with good clinical results, which are comparable to classic CPB. New technologies used in minisystems have proven lower immune system activation, which we can monitor using kinetics of proinflammatory and antiinflammatory mediators. In spite of these comparable laboratory results, we did not find differences in the short-term clinical result when comparing both groups of low risk patients.

Key words: cardiopulmonary bypass, miniinvasive extracorporeal circulation, inflammatory response, cytokines, coronary artery bypass grafting